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CHALLENGES OF ARTIFICIAL INTELLIGENCE (AI) IN HIGHER EDUCATION INSTITUTIONS IN LIBYA

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Abstract: This paper aims to gain a comprehensive understanding of the challenges faced by higher education institutions in Libya, particularly during their adoption of artificial intelligence (AI) technologies. The primary challenges identified include issues related to teaching and learning, transparency, and ethical concerns. There are also the challenges related to integrating artificial intelligence (AI) technologies with existing organizational structures and systems in institutions with the challenges of planning, training, and financing. The most important advantages, benefits, and risks of applying artificial intelligence in educational institutions in developing countries such as Libya, and how students can benefit from applications such as 'ChatGPT' to enhance their knowledge levels, will be addressed. These challenges are the central focus of this article. To address and overcome them, it is essential to examine international legislation related to artificial intelligence (AI) in the educational sector and use it as a framework for developing local regulations. In addition to reviewing previous studies and methodologies, the findings from the literature review and the analysis of international legislation emphasize the need for a structural model that supports the integration of artificial intelligence applications into the curricula of higher education institutions. The article also provides recommendations for students and educators on the responsible and thoughtful use of this technology, aiming to better prepare them to be more knowledgeable, open, and ready to embrace these innovations.

Keywords: Artificial Intelligence (AI), Higher Education, ChatGPT, Challenges, Institutions

1. INTRODUCTION

The integration of Artificial Intelligence (AI) into higher education marks a transformative shift that holds the potential to redefine teaching methods, learning environments, and institutional operations globally [1, 2, 3, 4, 5, 6, 7]. In academic institutions worldwide, AI technologies such as adaptive learning systems, intelligent tutoring systems, and

automated administrative tools are no longer just future prospects but are actively shaping the educational experience for both students and educators [8, 9]. These technologies offer personalized learning pathways, enhance educational outcomes, and streamline administrative processes, all of which support the broader objectives of accessibility, quality, and efficiency in higher education [1, 3].

In Libya, the context of higher education is marked by a unique set of challenges and opportunities. Amidst the efforts to recover and rebuild from years of conflict, the country's education sector is at a crossroads, seeking to embrace modernization and technological integration [10]. The current state of higher education in Libya is characterized by a pressing need for infrastructure development, curriculum reform, and enhanced access to educational resources [10, 11, 12, 13]. In this landscape, the potential role of AI technologies emerges as a particularly compelling avenue for innovation. However, the adoption of such AI technologies is not without its challenges, including infrastructural limitations, a lack of specialized knowledge, and distance between policy and practice [14]. Furthermore, there are ethical considerations related to privacy, data protection, and the potential for bias in AI algorithms [3, 15]. Educational institutions must navigate these ethical minefields carefully to protect students and ensure that AI technologies are used responsibly and fairly [16, 17, 18].

This paper focuses on many challenges faced by higher education institutions in Libya as they navigate the adoption of AI technologies. These challenges encompass technical and organizational barriers, ethical and transparency concerns, and the overarching issues of planning, training, and financing such initiatives. Addressing these challenges is of paramount importance, not only for the successful integration of AI into Libyan higher education but also for ensuring that such integration contributes positively to the educational landscape, aligning with national development goals and enhancing the quality of education for all students. The significance of tackling these challenges cannot be overstated. By systematically identifying and addressing the barriers to AI adoption, Libyan higher education institutions can unlock the transformative potential of these technologies, fostering an educational environment that is innovative, inclusive, and capable of preparing students for the complexities of the modern world. Through this exploration, the paper aims to contribute

to a deeper understanding of the unique context of Libyan higher education and to propose viable pathways forward in the era of digital transformation.

This paper is structured as follows: Section 2 presents background with an overview of the Libyan higher education system and its readiness for technological advancements and related works. Section 3 discusses the challenges and risks of AI integration in Libyan higher education institutes. Section 4 presents the methodologies for overcoming challenges and Section 5 provides a recommendation and concludes the paper.

2. BACKGROUND

The journey of AI from theoretical underpinnings to practical applications spans over several decades, marking significant milestones that have reshaped various sectors, including education. This evolution began in earnest in the mid-20th century, with the development of simple AI programs designed to mimic human problem-solving skills. Over time, advancements in machine learning, natural language processing, and robotics have expanded AI's capabilities, allowing for more sophisticated applications in educational settings. Today, AI in education encompasses a broad range of tools and technologies, from personalized learning algorithms and intelligent tutoring systems to automated administrative tasks and data analytics for improving institutional efficiency. In educational contexts, AI has been harnessed to tailor learning experiences to individual students' needs, provide instant feedback, facilitate remote learning, and enable educators to allocate more time to interactive teaching by automating routine tasks. These innovations have not only enhanced the quality of education but also its accessibility, making personalized learning experiences available to a wider audience.

In Libyan higher education system, is characterized by a complex interplay of challenges and opportunities. The sector has historically been shaped by various factors, including political instability, economic constraints, and

infrastructural deficits. Despite these challenges, there is a growing recognition of the need for technological advancement and the potential of digital transformation to revitalize the educational landscape. The readiness of Libyan higher education institutions for technological advancements are a work in progress with significant variations in infrastructure, resources, and digital literacy across the country.

Efforts to integrate technology into the Libyan educational system have been intermittent, influenced by the broader socio-political context. However, recent initiatives have signalled a renewed interest in leveraging technology to enhance education. The introduction of digital platforms for learning and administration, along with the exploration of e-learning solutions, marks the beginning of this journey. Specifically, the application of AI in Libyan universities is still in the nascent stages, with scattered examples of AI use for administrative efficiencies, such as student information systems, and in some cases, experimental applications in learning and research. The focus has largely been on building the necessary infrastructure and capacity to support more widespread adoption of AI technologies in the future.

Moreover, there is an emerging discourse among academics and policymakers in Libya on the potential of AI to transform higher education. This includes discussions on developing AI-centric curricula, fostering partnerships with the tech industry to facilitate knowledge exchange, and investing in research and development to tailor AI solutions to local educational needs. The backdrop of AI's global development and its potential application in Libyan higher education sets the stage for a detailed exploration of the challenges and opportunities ahead. As Libyan universities grapple with integrating AI into their systems, they stand at the cusp of a significant transformation that could redefine teaching, learning, and administration within the sector.

2.1. OVERVIEW OF THE LIBYAN HIGHER EDUCATION SYSTEM AND ITS READINESS FOR TECHNOLOGICAL ADVANCEMENTS

The Libyan higher education system, while rich in history and academic tradition, faces numerous challenges and opportunities in the context of technological advancements, particularly the integration of AI. The readiness of this system to embrace such advancements can be evaluated across various dimensions, including infrastructure and connectivity, faculty training and expertise, curriculum integration, and research collaboration.

- **Infrastructure and connectivity:** A foundational challenge for the integration of AI technologies within Libyan universities is the limited access to high-speed internet and the lack of reliable technological infrastructure. For AI applications to function effectively, they require not only stable and fast internet connections but also sophisticated hardware and software resources. Many educational institutions in Libya struggle with outdated technology and insufficient bandwidth, which severely limits their ability to adopt and leverage AI tools for educational purposes. Addressing these infrastructural deficiencies is a prerequisite for the successful implementation of AI in the higher education sector, necessitating significant investment in network capabilities and modern hardware to support data-intensive AI applications [13, 22, 23].
- **Faculty training and expertise:** The effective use of AI in education extends beyond the mere availability of technology. It requires faculty members who are well-versed in AI concepts, algorithms, and tools. Currently, there is a notable gap in AI literacy among educators in Libya, with many lacking the training to integrate AI technologies into their teaching methodologies effectively. To bridge this gap, capacity-building programs are essential, aimed at enhancing the AI expertise of faculty members. These programs should cover a broad range of topics, from the basics of AI and machine learning to more advanced subjects such as AI ethics,

ensuring educators are equipped to leverage AI in a manner that enriches the educational experience for students [19, 20, 21, 23].

- **Curriculum Integration:** For AI to have a lasting impact on the higher education landscape in Libya, it must be seamlessly integrated into the curriculum. This involves the development and embedding of AI-related courses within existing academic programs, ensuring students gain a comprehensive understanding of AI principles, ethical considerations, and practical applications. Such curricular integration is crucial for preparing the next generation of Libyan students to thrive in an increasingly AI-driven world. Moreover, it's important to foster interdisciplinary approaches that highlight the relevance of AI across various fields of study, from engineering and computer science to business and the social sciences.
- **Research collaboration** [10]: The advancement of AI in Libyan higher education can be significantly supported through research collaborations with international institutions. Engaging in joint projects and fostering a culture of knowledge exchange can accelerate AI research and innovation within Libyan universities. These collaborations offer valuable opportunities for capacity building, access to advanced technologies, and the sharing of best practices in AI education and research. By actively seeking out partnerships and collaborative initiatives, Libyan higher education institutions can overcome some of the resource limitations they face and position themselves at the forefront of AI research and application in the region.

2.2. RELATED WORKS

The adoption of artificial intelligence technology in the higher education system has garnered significant attention in many developed countries. There is no doubt that education systems in most developing countries face challenges related to the lack of accurate and comprehensive research. Unfortunately, in Libya, the development of research in

education is still in its early stages, limiting the potential for progress and innovation in the sector. It reviewed many previous studies and research related to integrating artificial intelligence technology into the educational process in higher education institutions, which in turn contributed to building a deeper and broader understanding of the topic in question.

The relationship between artificial intelligence and education is shaped by a vast network of actors, not only technology developers or educators. In turn, artificial intelligence technologies develop within the established educational and technological contexts and do not arise spontaneously or on their own [13].

Security and politics are the main issues for developing higher education in Libya [2]. The direct consequences of the current conflict are the destruction of major infrastructure at higher education institutions, resulting from increased levels of insecurity and instability at the political level. This made it impossible to develop long-term strategic planning to develop the higher education system and integrate it with artificial intelligence technology. • Other important factors that should be considered relevant are basic technologies and expertise, economic dependence on oil and the dollar, the outdated legal framework for higher education, and the lack of links between the higher education system and the needs of Libyan society (private, public and civil society sectors).¹

UNESCO held the conference titled "Planning Education in the AI Era: Lead the Leap" in Beijing, China, in which ten essential topics including policy formulation, learning management, teaching, and teacher development were discussed. AI is the essential power to promote educational reform [14].

¹ www.tempus-unigov.eu

CHALLENGES AND RISKS OF INTEGRATING AI IN HIGHER EDUCATION IN LIBYA

2.3. CHALLENGES OF INTEGRATING AI IN HIGHER EDUCATION IN LIBYA

The integration of AI into higher education in Libya brings a complex array of challenges that span from pedagogical, technical to ethical, and strategic dimensions. Each of these challenges requires careful consideration and strategic planning to navigate successfully.

2.3.1. TEACHING AND LEARNING CHALLENGES

The integration of AI into the higher education sector in Libya presents a unique set of teaching and learning challenges. These challenges revolve around the adaptation of curriculum and teaching methods, as well as ensuring the readiness of both faculty and students for an AI-enhanced education. Addressing these challenges is crucial for leveraging AI to improve educational outcomes and prepare students for a future shaped by technological advancement.

2.3.2. TECHNICAL AND ORGANIZATIONAL CHALLENGES

Overcoming these challenges requires a strong commitment to modernizing technology infrastructure, providing ongoing training and support to staff and students, ensuring compliance with local and international laws and regulations, in addition to providing sufficient funding to modernize educational technology.

2.3.3. TRANSPARENCY AND ETHICAL CHALLENGES

1. Data privacy and security: The use of AI in education often involves the collection and analysis of large amounts of personal data from students, raising significant concerns about privacy and security. Institutions must implement stringent data protection measures and transparent policies to safeguard

this information and maintain trust among students and faculty.

2. Bias and fairness in AI applications: AI systems, being products of their training data and algorithms, can inadvertently perpetuate biases if not carefully designed and monitored. Ensuring AI applications in education are fair and unbiased requires ongoing scrutiny of the data and algorithms used, as well as the implementation of ethical guidelines for AI development and use within educational contexts.

2.3.4. PLANNING, TRAINING, AND FINANCING CHALLENGES

1. Planning challenges: Higher education institutions in Libya lack clear and specific strategies for integrating artificial intelligence technology into their educational activities.

2. Training challenges: Higher education institutions in Libya face difficulty in providing well-trained human resources in the field of artificial intelligence. In addition to the weakness of appropriate training programs to qualify human cadres to use and apply artificial intelligence technologies.

3. Funding challenges: There are clear challenges in securing sufficient funding to develop technical infrastructure and implement appropriate training programs. Under difficult economic conditions, educational institutions may rely heavily on government funding, which may not be sufficient to meet modern technology needs.

2.4. RISKS OF APPLYING AI IN LIBYAN HIGHER EDUCATIONAL INSTITUTIONS

The integration of AI into the educational landscape of Libya offers transformative potential. However, this integration is not without its risks. These risks range from creating dependencies on technology to raising ethical and privacy concerns and even exacerbating existing social inequalities through the digital divide. Understanding these risks is crucial for developing strategies that mitigate them while harnessing AI's benefits.

2.4.5. DEPENDENCE ON TECHNOLOGY AND POTENTIAL OBSOLESCENCE

One significant risk associated with the widespread adoption of AI in education is the development of an overreliance on technological solutions. This dependence can manifest in several ways:

- **Reduced critical thinking:** There's a risk that students may become overly reliant on AI for problem-solving and decision-making, potentially at the expense of developing critical thinking and analytical skills. It's essential to balance the use of AI tools with educational approaches that foster independent thought and creativity.
- **Technology obsolescence:** The rapid pace of technological advancement means that AI tools and systems can quickly become outdated. Educational institutions face the challenge of continually updating their technological infrastructure and software to keep pace with advancements, which can be financially burdensome and logistically challenging.
- **Skill gaps:** As educational institutions increasingly incorporate AI into their teaching and administrative processes, there's a risk that faculty and staff may not keep up with the evolving technology, leading to skill gaps that can hinder the effective use of AI in education.

2.4.6. ETHICAL CONCERNS AND DILEMMAS

The deployment of AI in education also raises several ethical and privacy issues:

- **Bias and discrimination:** AI algorithms can inadvertently perpetuate biases present in their training data, leading to discriminatory outcomes. In the educational context, this could manifest in biased grading systems, learning recommendations, or admission processes, potentially discriminating against certain groups of students.
- **Surveillance concerns:** The use of AI for monitoring student performance and behavior could lead to a culture of surveillance, raising concerns about the erosion of trust and the impact on student autonomy and privacy.

2.4.7. POTENTIAL FOR WIDENING THE DIGITAL DIVIDE

Perhaps one of the most significant risks is the potential for AI to widen the digital divide:

- **Access to technology:** There's a risk that the benefits of AI-enhanced education will not be equitably distributed. Students in urban and more affluent areas may have better access to the necessary technology and connectivity than those in rural or economically disadvantaged regions, exacerbating existing educational inequalities.
- **Digital literacy:** The effective use of AI in education requires a certain level of digital literacy among students and educators. Without widespread and inclusive digital education initiatives, there's a risk that those without the necessary skills will be left behind.

3. METHODOLOGIES AND STRATEGIES FOR OVERCOMING CHALLENGES

To overcome these challenges, Libyan higher education institutions need to adopt a strategic approach that includes:

- **Firtilly**, the adaptation of curriculum and teaching methods. The introduction of AI technologies necessitates a comprehensive re-evaluation and adaptation of existing curricula and teaching methodologies. This adaptation involves several key dimensions:
- **Curricular content:** Updating curricular content to include AI and related technological advancements is essential. This means not only offering specialized courses in AI for students pursuing studies in computer science and engineering but also integrating AI concepts across a wide range of disciplines. For instance, business students could benefit from courses on AI's impact on marketing and finance, while medical students might study AI applications in healthcare diagnostics and patient care.
- **Pedagogical approaches:** Traditional lecture-based teaching methods may not be sufficient to engage students with AI technology

effectively. Instead, educators are encouraged to adopt more interactive, hands-on learning experiences that allow students to work directly with AI tools and systems. Project-based learning, simulations, and collaborative research projects can provide practical experience with AI, fostering deeper understanding and skill development.

- **Interdisciplinary learning:** AI's impact spans multiple fields, making interdisciplinary learning approaches critical. By encouraging collaboration between departments, students can gain a holistic understanding of AI's applications and ethical considerations, preparing them for the complexities of the modern workforce.

Secondly, faculty and student readiness for AI-enhanced education. Ensuring that both faculty and students are ready to embrace AI-enhanced education involves several strategies:

- **Faculty development:** Faculty members play a pivotal role in the successful integration of AI into teaching and learning. However, many may not have the necessary background in AI technologies. Professional development programs are crucial for updating faculty skills and knowledge. Workshops, seminars, and sabbaticals focused on AI education can help faculty integrate AI tools into their teaching practices effectively.
- **Student engagement:** Students need to be prepared for a learning environment where AI tools are an integral part of their education. This preparation includes developing digital literacy skills and an understanding of how AI can enhance their learning experience. Initiatives such as tech labs, AI clubs, and hackathons can stimulate interest and engagement with AI technologies among students.
- **Cultural shift:** Embracing AI in education requires a cultural shift among all stakeholders towards valuing innovation and technological advancement. Creating an institutional culture that encourages experimentation, adaptability, and continuous learning is essential. This can be fostered through open

dialogues about the benefits and challenges of AI in education, highlighting success stories, and recognizing innovative teaching practices.

4. RECOMMENDATIONS AND CONCLUSION

4.5. RECOMMENDATIONS FOR THE INTEGRATION OF AI IN LIBYAN HIGHER EDUCATION

The successful integration of AI into Libyan higher education requires concerted efforts from policymakers, institutions, faculty, and students. Each stakeholder group plays a crucial role in navigating the challenges and unlocking the potential benefits of AI in education. The following recommendations aim to provide a roadmap for effective AI adoption across the educational ecosystem. By adhering to these recommendations, stakeholders in Libyan higher education can navigate the challenges of AI integration, leveraging its potential to transform teaching and learning while ensuring ethical use and equitable access.

4.5.8. FOR POLICYMAKERS

Developing Supportive Frameworks including:

- 1) **Libyan data protection legislation:** Enact robust data protection laws that safeguard students' and educators' personal information, aligning with international standards to ensure privacy and security in the use of AI technologies.
- 2) **AI ethics and standards:** Establish clear ethical guidelines and standards for AI use in educational contexts, including provisions to prevent bias and discrimination and to ensure transparency and accountability in AI systems.
- 3) **Funding and incentives:** Allocate resources and create incentives for institutions to adopt AI technologies, including grants for infrastructure development, research in AI education, and pilot projects that

demonstrate innovative uses of AI in teaching and learning.

- 4) **Collaborative platforms:** Facilitate the creation of collaborative platforms for sharing knowledge, best practices, and resources related to AI in education, encouraging partnerships between educational institutions, technology companies, and international organizations.

4.5.9. FOR INSTITUTIONS

Strategies for Infrastructure, Training, and Ethical AI Use include:

- 1) **Infrastructure investment:** Prioritize investments in technological infrastructure to support AI applications, including high-speed internet access, modern hardware, and software solutions that are scalable and secure.
- 2) **Faculty and staff training:** Implement comprehensive training programs for faculty and administrative staff to enhance their understanding of AI technologies, pedagogical approaches for integrating AI into teaching, and ethical considerations in AI use.
- 3) **Ethical AI framework:** Develop and implement an institutional framework for ethical AI use, incorporating principles of fairness, accountability, and transparency, and establish oversight mechanisms to monitor AI applications within the institution.
- 4) **Student-centric AI initiatives:** Design and implement AI initiatives that prioritize student engagement and learning outcomes, including personalized learning experiences, AI-enhanced tutoring systems, and interactive AI learning tools.

4.5.10. FOR FACULTY AND STUDENTS

Embracing AI for enhanced learning and teaching:

- 1) **Active engagement with AI:** Encourage active engagement with AI technologies through hands-on projects, research, and collaboration, fostering a culture of

innovation and continuous learning among students and faculty.

- 2) **Critical thinking and ethics:** Promote critical thinking about the implications of AI in society, including ethical considerations, privacy issues, and the social impact of technology, integrating these discussions into the curriculum across disciplines.
- 3) **Lifelong learning:** Advocate for a mindset of lifelong learning, recognizing that the rapid evolution of AI and technology more broadly requires continuous adaptation and skill development to remain relevant in the workforce.
- 4) **Collaboration and exchange:** Foster opportunities for collaboration and knowledge exchange on AI topics within and between institutions, including interdisciplinary projects, industry partnerships, and international collaborations.

6. CONCLUSION AND FUTURE WORK²

Conclusion: Although the Libyan government has paid greater attention to developing the education system in general, and the higher education system in particular, as higher education is the most important sector for achieving a high level of the education system in Libya, it is clear that the higher education system still faces many challenges. This may be due to a lack of teacher training, especially in pedagogy, and technology. Therefore, all the

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challenges and weaknesses identified in higher education institutions and their system must be addressed effectively, so that a highly suitable educational system can be achieved.

Future work: In order to overcome the challenges of future work in this field, researchers, education administrators, policymakers, and specialists in the field of education and technology must work together to develop specific and effective strategies to overcome these challenges

and achieve integration and success of the use of technology and artificial intelligence in higher education institutions in Libya. Future research that focuses on exploring new ways to integrate technology and AI into education should also be considered, as well as providing practical and concrete recommendations to improve the educational process and enhance the quality of education in the country.

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IZAZOVI VEŠTAČKE INTELIGENCIJE (AI) U VISOKOŠKOLSKIM USTANOVAMA U LIBIJI

Rezime: Ovaj rad ima za cilj da dobije tačno razumevanje izazova sa kojima se suočavaju visokoškolske institucije u Libiji, posebno tokom njihovog usvajanja tehnologija veštačke inteligencije (AI), od kojih su najistaknutiji izazovi nastave i učenja, transparentnosti i etički izazovi. Postoje i izazovi koji se odnose na integraciju tehnologija veštačke inteligencije (AI) sa postojećim organizacionim strukturama i sistemima u institucijama sa izazovima planiranja, obuke i finansiranja. „Razgovaraće se o najvažnijim prednostima, prednostima i rizicima primene veštačke inteligencije u obrazovnim institucijama u zemljama u razvoju kao što je Libija, kao i o tome kako učenici mogu da imaju koristi od aplikacija kao što je ‘ChatGPT’ da poboljšaju svoje nivoe znanja. Svi ovi izazovi čine glavnu temu ovog članka, a za pronalaženje rešenja i njihovo prevazilaženje neophodno je proučiti međunarodno zakonodavstvo u vezi sa veštačkom inteligencijom (AI) u ovoj obrazovnoj oblasti i koristiti ga kao model za razvoj domaćeg zakonodavstva. Pored pregleda prethodnih studija i korišćenih metodologija, nalazi iz pregleda literature i primene međunarodnog zakonodavstva ističu obezbeđivanje strukturnog modela koji ugošćuje neophodnost integracije aplikacija veštačke inteligencije u nastavne planove i programe visokoškolskih ustanova i daju preporuke za učenika i nastavnika u vezi sa pažljivim i pažljivim korišćenjem ove tehnologije i da ih dobro pripremi za više znanja, kao i otvorenost i spremnost da prime ove inovacije.

Ključne reči: veštačka inteligencija (AI), visoko obrazovanje, ChatGPT, izazovi, institucije.